WHAT IS CLAIMED IS:

1. A spinal stabilization system comprising:

(a) a stabilizing element comprising a first segment and a second segment, the first and second segments connected by a pivoting joint;

(b) a first connector adapted to connect the stabilizing element to a first vertebra in a spinal column;

(c) a second connector adapted to connect the stabilizing element to a second vertebra in the spinal column; and

(d) a disc prosthesis or a disc nucleus replacement disposed between two adjacent vertebrae in the spinal column.

2. The spinal stabilization system of claim 1, wherein the stabilizing element is a rod.

3. The spinal stabilization system of claim 1, wherein the stabilizing element is a plate.

4. The spinal stabilization system of claim 1, wherein the first and second connectors comprise pedicle screws, lateral mass screws or hooks.

5. The spinal stabilization system of claim 1, wherein the first segment comprises a proximal end defining a generally spherical socket and the second segment comprises a proximal end comprising a spherical ball adapted to fit into the socket to provide a ball-and-socket type joint.

6. The spinal stabilization system of claim 1, wherein the generally spherical socket comprises a flat strip running laterally around its midsection.

7. The spinal stabilization system of claim 1, wherein:

(a) the first segment comprises a socket extending into its proximal end, the socket defined, at least in part, by two opposing concave surfaces separated by a gap; and

(b) the second segment comprises an insert formed on a neck at its proximal end, the insert comprising two opposing convex surfaces;

wherein the insert fits into the socket to provide a pivoting joint.

8. The spinal stabilization system of claim 7, wherein the two opposing concave surfaces each comprises a flat strip extending laterally along at least a portion of the apex of concavity.

9. The spinal stabilization system of claim 7, further comprising a damping element disposed around the neck.

10. The spinal stabilization system of claim 7, wherein the socket is characterized by a central axis and further wherein the socket is further defined by a housing centered on its central axis and opening into the gap, the spinal stabilization system further comprising a damping element disposed within the housing.

11. The spinal stabilization system of claim 7, wherein the central axis of the socket is not parallel to the longitudinal axis of the stabilizing element.

12. The spinal stabilization system of claim 1, further comprising:

(a) a second stabilizing element comprising a third segment and a fourth segment, the third and fourth segments connected by a pivoting joint;

(b) a third connector adapted to connect the second stabilizing element to the first vertebra; and

(c) a fourth connector adapted to connect the second stabilizing element to the second vertebra.

13. The spinal stabilization system of claim 12, further comprising a transverse connector connecting the first stabilizing element to the second stabilizing element.

14. The spinal stabilization system of claim 13, wherein the transverse connector comprises a first segment and a second segment, the first and second segments connected by a pivoting joint.

15. The spinal stabilization system of claim 1, further comprising a tissue growth-resistant material disposed around the pivoting joint.

16. The spinal stabilization system of claim 1, wherein the first and second segments are comprised of a plurality of interconnecting sections.

17. The spinal stabilization system of claim 1, further comprising one or more prosthetic vertebral bodies disposed within the spinal column.

18. The spinal stabilization system of claim 1, further comprising:

(a) a socket extending into a proximal end of the first segment;

(b) a pin extending outwardly from a proximal end of the second segment, the pin comprising a distal end and a collar extending radially outwardly from the pin; and

(c) a first damping element disposed around the pin above the collar and a second damping element disposed around the pin below the collar;

wherein the pin and the first and second damping elements extend into the socket to form a joint allowing multidirectional pivoting of the pin in the socket.

19. The spinal stabilization system of claim 7, wherein the one of the first or second segments comprises at least one tab extending outwardly from its proximal end, the at least one tab defining a window, and the other of the first or second segment comprises at least one arm extending outwardly from its proximal end and through the window of the at least one tab.

20. The spinal stabilization system of claim 19, further including at least one damping element disposed around the at least one arm.

21. A spinal stabilization element comprising:

(a) a first segment comprising a socket extending into its proximal

end, the socket defined, at least in part, by two opposing concave surfaces separated by a gap;

(b) a second segment comprising an insert formed on a neck at a proximal end of the second segment, the insert comprising two opposing convex surfaces;

(c) a first connector adapted to connect the stabilizing element to a first vertebra in a spinal column; and

(d) a second connector adapted to connect the stabilizing element to a second vertebra in the spinal column;

wherein the insert fits into the socket to provide a pivoting joint.

22. The spinal stabilization system of claim 21, wherein the two opposing concave surfaces each comprises a flat strip extending laterally along at least a portion of the apex of concavity.

23. The spinal stabilization system of claim 21, further comprising a damping element disposed around the neck.

24. The spinal stabilization system of claim 21, wherein the socket is characterized by a central axis and further wherein the socket is further defined by a housing centered on its central axis and opening into the gap, the spinal stabilization system further comprising a damping element disposed within the housing.

25. The spinal stabilization system of claim 21, wherein the central axis of the socket is not parallel to the longitudinal axis of the stabilizing element.

26. A spinal stabilization system comprising:

(a) a stabilizing element comprising:

(i) a first segment defining a housing in its proximal end, the housing having a ceiling; and

(ii) a second segment comprising a piston extending outwardly from its proximal end, the piston extending into the housing;

(b) a damping element disposed in the housing between the piston

and the ceiling of the housing, wherein the housing is free of damping fluid;

(c) a first connector adapted to connect the first segment to a first vertebra in a spinal column;

(d) a second connector adapted to connect the second segment to a second vertebra in the spinal column; and

(e) a disc prosthesis or disc nucleus replacement disposed between adjacent vertebrae in the spinal column.

27. The spinal stabilization system of claim 26, wherein the damping element is a spring.

28. The spinal stabilization system of claim 26, wherein the damping element is a elastomeric bumper.

29. A spinal stabilization system, comprising:

(a) a first flexible rod;

(b) a first connector, adapted to connect the first flexible rod to a first vertebra in a spinal column in a manner that allows the rod to translate longitudinally with respect to the first vertebra;

(c) a second connector, adapted to connect the first flexible rod to a second vertebra in the spinal column in a manner that prevents the rod from translating longitudinally with respect to the second vertebra; and

(d) a disc prosthesis or disc nucleus replacement disposed between two adjacent vertebrae in the spinal column.

30. The spinal stabilization system of claim 29, wherein the first flexible rod is capable of rotating in at least one direction at the first connector.

31. The spinal stabilization system of claim 29, wherein the first flexible rod is capable of rotating in all directions at the first connector.

32. The spinal stabilization system of claim 29, wherein the first flexible rod is locked from either rotation or translation at the first connector.

33. The spinal stabilization system of claim 29, wherein the first connector comprises a threaded shaft adapted to penetrate a bone and a head having a bore extending laterally therethrough, wherein the bore has a diameter large enough to allow the first rod to translate through the bore.

34. The spinal stabilization system of claim 29, wherein the second connector comprises a pedicle screw, a polyaxial pedicle screw, a lateral mass screw, a hook, or a polyaxial hook.

35. The spinal stabilization system of claim 29, further comprising a damping element disposed around the first flexible rod between the first and second connectors.

36. The spinal stabilization system of claim 35, wherein the damping element is a spring.

37. The spinal stabilization system of claim 29, further comprising a second bias device, the second bias device comprising:

(a) a second flexible rod;

(b) a third connector, adapted to connect the second flexible rod to the first vertebra in a manner that allows the rod to translate longitudinally with respect to the first vertebra;

(c) a fourth connector, adapted to connect the second flexible rod to the second vertebra in a manner that prevents the rod from translating longitudinally with respect to the second vertebra.

38. A spinal stabilization system, comprising:

(a) a first damping element adapted to be connected between a first vertebra in a spinal column and a second vertebra in a spinal column;

(b) a second damping element adapted to be connected between the first vertebra and the second vertebra; and

(c) a disc prosthesis or disc nucleus replacement disposed between two adjacent vertebrae in the spinal column.

39. The spinal stabilization system of claim 38, wherein the first and second damping elements are springs.

40. The spinal stabilization system of claim 39, wherein the springs are selected from the group consisting of coiled springs, leaf springs, articulated leaf springs, torsional springs, torsional leaf springs, or articulated torsional leaf springs.